

A summary of large raindrop observations from GPM GV Field Campaigns

Patrick N. Gatlin, NASA Marshall Space Flight Center, Huntsville, AL

Walter Petersen, NASA Wallops Flight Facility, Wallops Island, VA

Ali Tokay, NASA Goddard Space Flight Center, Greenbelt, MD

Merhala Thurai and V.N. Bringi, Colorado State University, Fort Collins, CO

Lawrence Carey and Matthew Wingo, University of Alabama Huntsville, Huntsville, AL

ABSTRACT

NASA's Global Precipitation Measurement Mission (GPM) has conducted a series of Ground Validation (GV) studies to assist algorithm development for the GPM core satellite. Characterizing the drop size distribution (DSD) for different types of precipitation systems is critical in order to accurately estimate precipitation across the majority of the planet. Thus far, GV efforts have sampled DSDs in a variety of precipitation systems from Finland to Oklahoma. This dataset consists of over 33 million raindrops sampled by GPM GV's two-dimensional video disdrometers (2DVD) and includes RSD observations from the LPVEx, MC3E, GCPEX, HyMEX and IFloodS campaigns as well as from GV sites in Huntsville, AL and Wallops Island, VA. This study focuses on the larger end of the raindrop size spectrum, which greatly influences radar reflectivity and has implications for moment estimation. Thus knowledge of the maximum diameter is critical to GPM algorithm development. There are over 24,000 raindrops exceeding 5 mm in diameter contained within this disdrometer dataset. The largest raindrops in the 2DVD dataset (>7-8 mm in diameter) are found within intense convective thunderstorms, and their origins are believed to be hailstones. In stratiform rainfall, large raindrops have also been found to fall from lower and thicker melting layers. The 2DVD dataset will be combined with that collected by dual-polarimetric radar and aircraft particle imaging probes to "follow" the vertical evolution of the DSD tail (i.e., retrace the large drops from the surface to their origins aloft).